9. ULTRASTRUCTURE OF PARTIALLY DISSOLVED POLLEN GRAINS OF PLATANUS HYBRIDA BROT.

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Abstract

Fresh pollen grains of *Platanus hybrida* BROT. were partially dissolved with diluted glycerine of 50% and investigated with transmission electron microscope. The ultrastructure data are completely different from those of the dissolution experiment by the other previously used organic solvents. Particularly the well preserved organelles of the protoplasm are worth of mentioning, This is important because the recent and fossil pollen material in the laboratories are preserved in dilute glycerine with some antimicrobial products such as phenol aq. dil. or mercury-chlorure.

Key words: Palynology, experimental, ultrastructure, *Platanus hybrida.*

Introduction

During the last years we carried out several kinds of experiments to a better knowledge of the particularly interesting and difficult macromolecular system of the sporopollenin. The partial degradation processes and the solubility or resistance of the sporopollenin of the different taxa are important to understand the complexity of this problem.

Taking into consideration that for the preservation of the recent and fossil pollen grains the glycerine jelly is a quite generally used mounting medium, or the recent and fossil sporomorphs are mounted in glycerine with phenol or chloride of mercury we planned to use glycerine also as one of the organic solvents. This paper presents our first results in this subject.

Materials and Methods

The pollen grains were collected by Miss Á. ERDŐDI in the Botanical Garden of the J. A. University on 30.04.1996. The experiment (1/7-472) was the following: 5 ml glycerine (50%) was added to 5 mg fresh pollen grains. Temperature: 30 °C, length of time 30 days. The pollen material was washed with distilled water, then postfixed with 1.0% OsO4 aq. dil. and embedded in Araldite (Durcupan, Fluka). The ultrathin sections were made in the EM Laboratory of the Institute of Biophysics of the Hungarian Academy of Sciences. Biological Research Center on a Porter Blum ultramicrotome. The microphotographs were made on an Opton EM-902 (resolution 2-3 Å), and on a Tesla BS-540

(resolution 6-7 Å), For the basic works of the organelles of the protoplasms we used the handbooks as follows: HALL (1978), CSABA and MADARÁSZ (1981), KIMBALL (1984), AVERS (1985), DARNELL, LODDISH and BALTIMORE (1986).

Results

The general survey pictures (Plate 9.1., figs. 1,2) well illustrate the ultrastructure of the pollen grain. Tectate, perforated ectexine, infratectum columellar. Beneath the foot layer the intine is two layered, by its electron density. The plasma membrane and the organelles of the protoplasm also well shown. The nucleus and particularly in picture 1, of Plate 9.1. the fine structure of the nucleolus is well illustrated. In the protoplasm there are electron dense granules (microbodies), and lighter globular vacuoles.

Highly magnified pictures of the fine structure of the apertural area are well shown (Plate 9.2., fig. 1). Remnants of the infratectal layer are characteristic in the colpus area, and the inner endexious layer is also well shown. Different layers of the intine and the plasma membrane are characteristic. In picture 1, and 2, of Plate 9.2., the microbodies of the protoplasm are well illustrated. Plate 9.3., figs. 1,2, illustrate the fine structure of the protoplasm in particular of the nucleus. Well shown are the microbodies, mitochondrion, Golgi like vesicles. Beneath the nuclear envelope there are heterochromatin granules. Highly magnified picture from the nuclear envelope is illustrated in Plate 9.4., fig. 1. Picture 2 (Plate 9.4.) illustrates lamellae (tubuli) around the nucleus. These lamellae (tubuli) are illustrated in highly magnified picture in Plate 9.5.

Discussion and Conclusions

Taking into consideration the basic problem of the solvent effect of the glycerine, we need to emphasize the following:

1. The ultrastructure of the layers of the wall, have not altered. Ectexine and particularly the intine was in a good preservation.
2. The organelles of the protoplasm are also well preserved in contrast to the other solution experiments.
3. Finally the conservation of the pollen grains in diluted glycerine may be used as a good mounting medium.

Acknowledgements

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References

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Plate 9.1.

1,2. *Platanus hybrida* BROT., Experiment No: 1/7-472, General survey picture of the ultrastructure of the pollen grain. Negative nos: picture 1: 6423, 5.000x, picture 2: 6427, 5.000x.

Plate 9.2.

1,2. *Platanus hybrida* BROT., Experiment No: 1/7-472.
1. Detail of the ultrastructure of the pollen grains in the apertural area. Negative no: 6429. 15.000x, mb: microbodies.
2. Ultrastructure of the pollen grain in the interapertural area. Negative no: 6426, 15.000x.

Plate 9.3.

1,2. *Platanus hybrida* BROT., Experiment No: 1/7-472.
1. General survey picture of the protoplasm of the pollen grain. Well shown are the heterochromatine granules beneath the nuclear envelope. Negative no: 6422, 5.000x.
2. Detail of the ultrastructure of the protoplasm. Negative no: 6423, 20.000x, ne: nuclear envelope, g: Golgi like vesicles, mb: microbodies, M: mitochrondrion.

Plate 9.4.

1,2. *Platanus hybrida* BROT., Experiment No: 1/7-472.
1. Detail of the nucleus of the pollen grain. Negative no: 6723, 100.000x, ne: nuclear envelope.
2. Detail of the ultrastructure of the pollen grain. Illustrated are the lamellae (tubuli) around the nucleus. Negative no: 5811, 100.000x.

Plate 9.5.

Platanus hybrida BROT., Experiment No: 472, detail of the nucleus and the cytoplasm and the lamellae (tubuli) around the nucleus. Negative no: 5811, 300.000x.

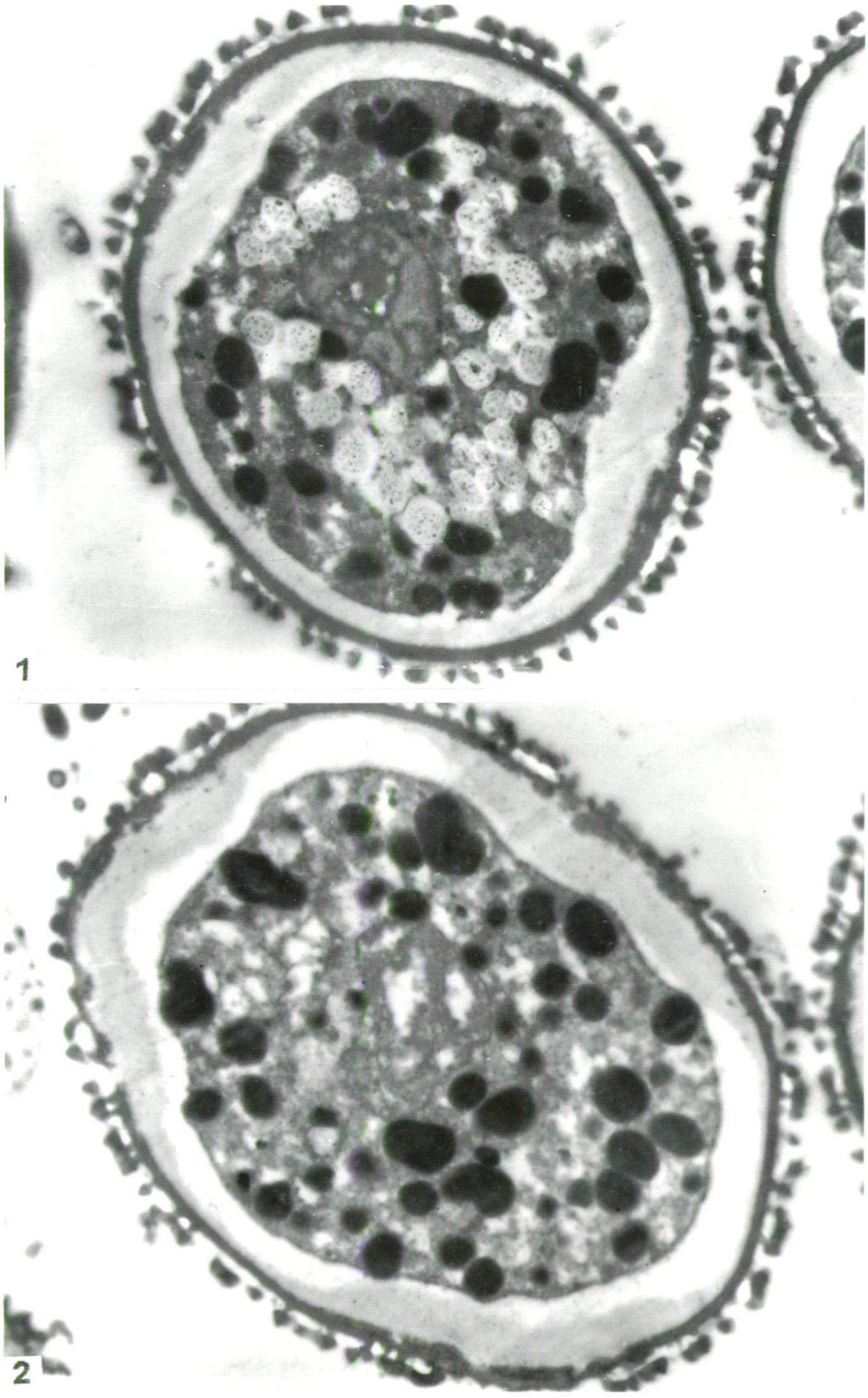

Plate 9.1.

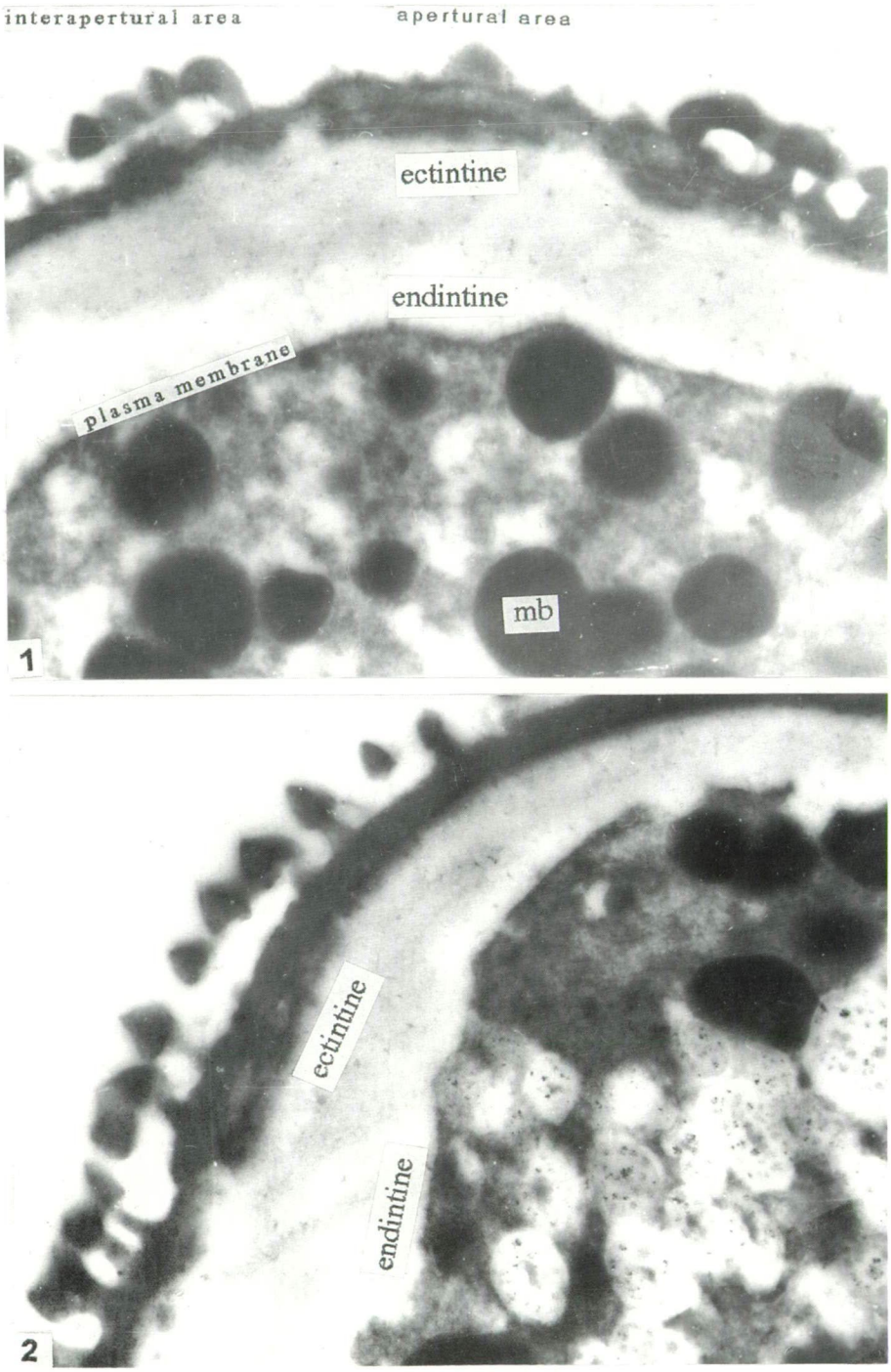
interapertural area
apertural area
ectintine
endintine
plasma membrane
mb
1
ectintine
endintine
2

Plate 9.2.

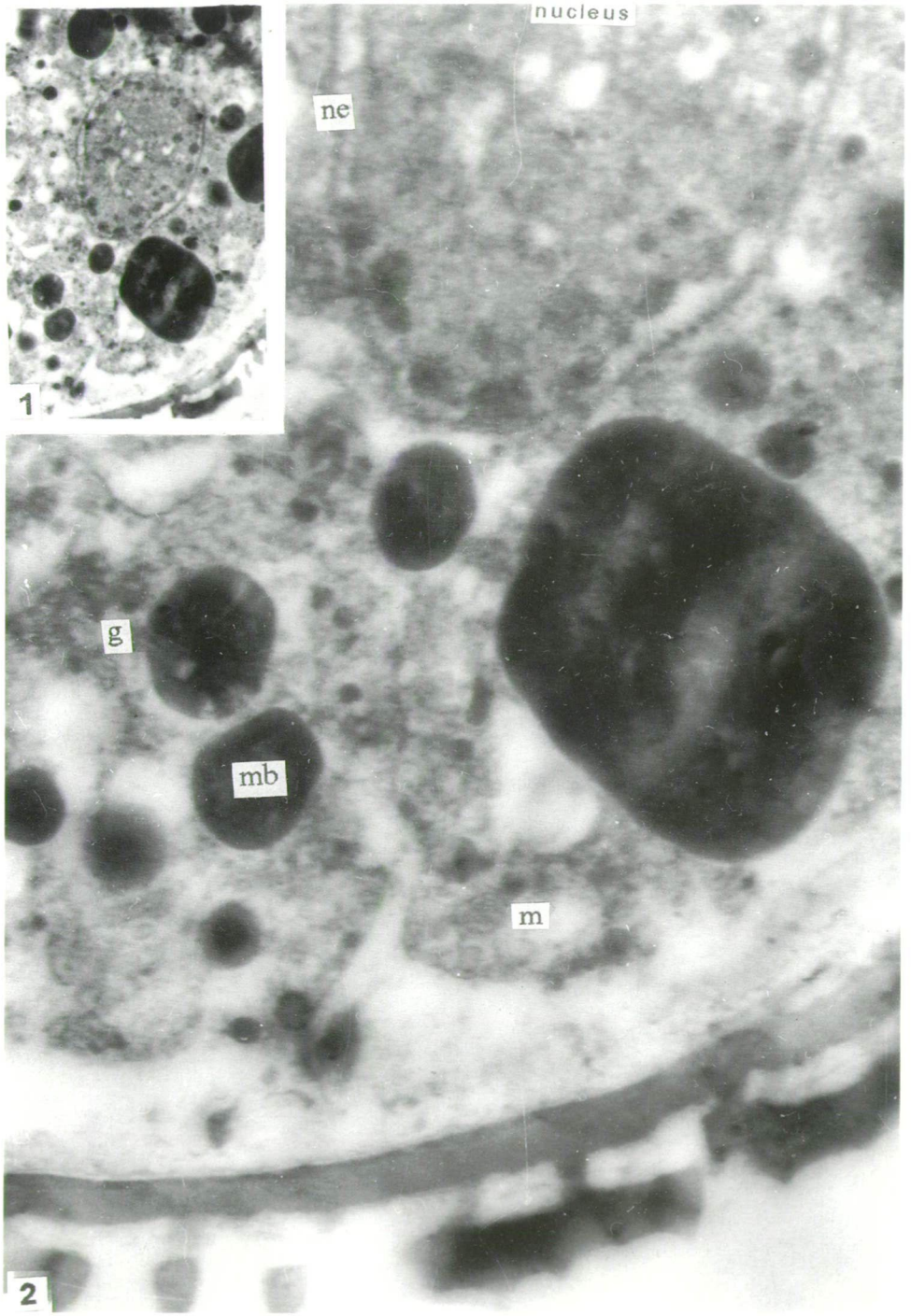

Plate 9.3.

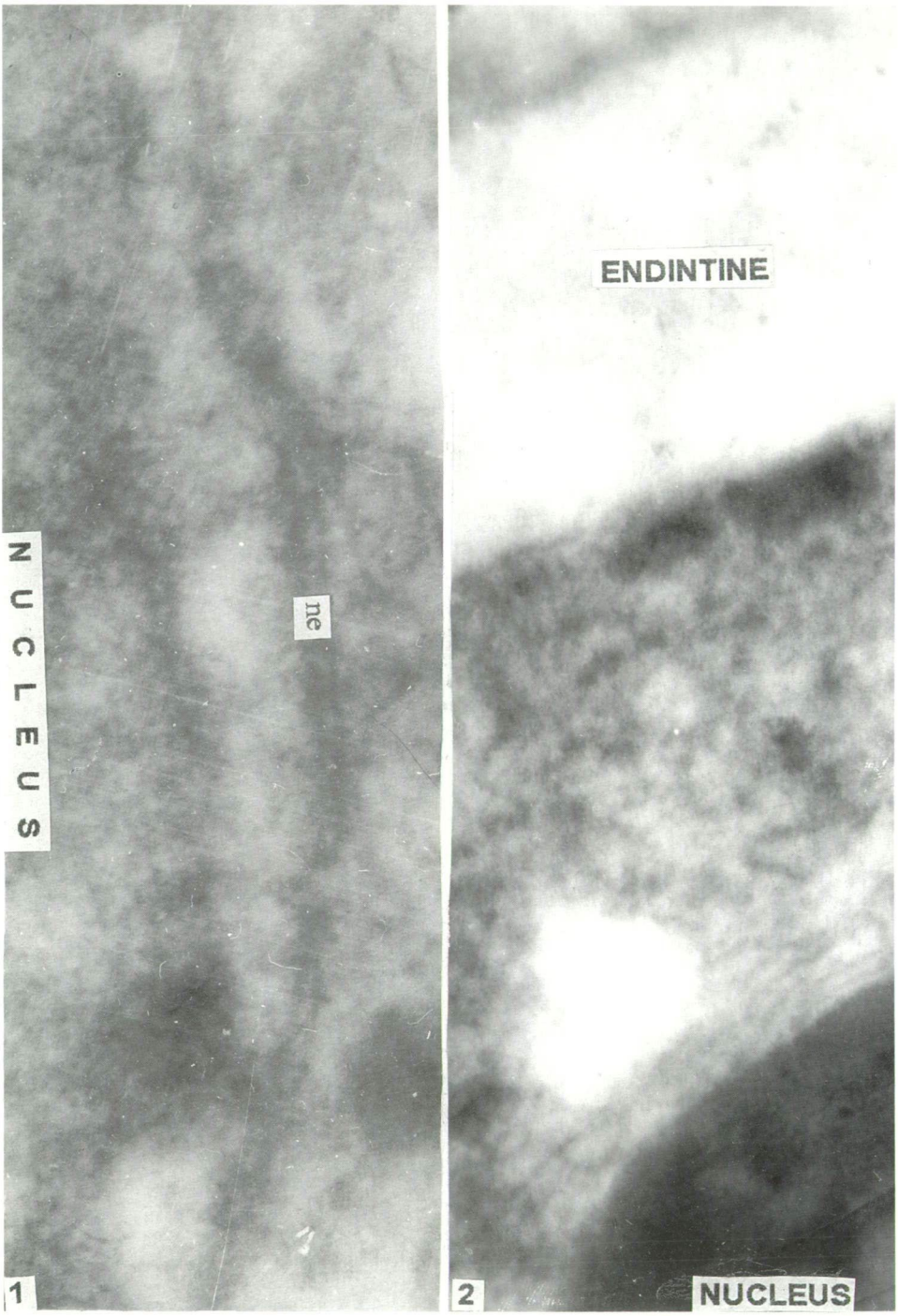

Plate 9.4.

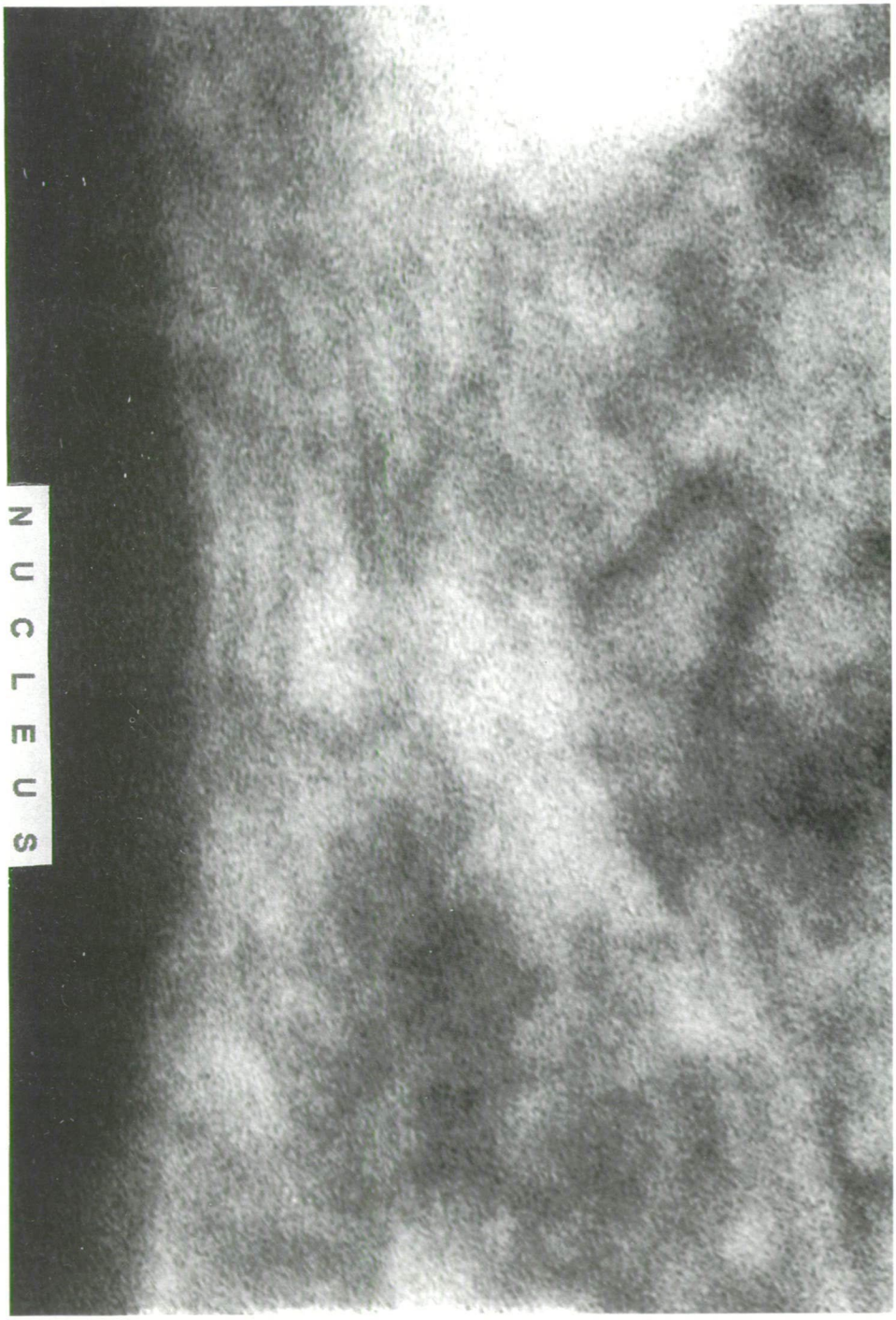

Plate 9.5.